Dec. 1, 1992

Catch Basin

Description

Catch basins are stormwater inlets to the sewer system which contain a sump to capture solids and thereby prevent sewer blockages.

Note: This BMP should not be implemented unless a regular maintenance program is adhered to. Uncleaned catch basins may contribute loads of biological oxygen demand (BOD) and sediment to the receiving stream. If regular maintenance cannot be done, use an alternative to catch basins such as simple inlets (without sediment traps), Street Sweeping, sewer cleaning, off-line storage, or flow attenuation.

Pollutants Controlled and Impacts

Catch basins are reasonably effective in protecting sewers from receiving loads of coarse solids greater than 0.04 inches in diameter. They are not very effective in capturing fine particles such as clays or silt.

The trapped liquid flushed from catch basins during the "first-flush" from storm events may have a high pollutant loading (e.g. BOD). This liquid can be displaced to the sewer by a rainfall of as little as 0.02 in/hr, lasting four hours.

Application

Land Use
This BMP is most commonly used in urban areas, but may have rural applications along roads.

Soil/Topography/Climate
This BMP is most effective in capturing coarse soils.

When to Apply
Apply this BMP following the stabilization of up-slope areas.

Where to Apply
Apply in locations where large solids need to be removed and where strict maintenance schedules can be adhered to. Catch basins are typically built at the curbline of streets, although they may be built entirely below ground. The inflow is typically through a grating at the curbline. In locations where clay, silt, nutrients, or other pollutants may pass through the catch basin, direct discharges to surface waters should be avoided.

Relationship With Other BMPs

In urban areas, use with Street Sweeping. To avoid direct discharge to surface waters, use with Sediment Basins, Extended Detention Basins, or Wet Detention Basins.

Specifications

Planning Considerations:

1. Evaluate the site for potential pollutant loadings. If pollutant loadings will be high, avoid direct discharge to surface waters by using another BMP, or by using this BMP with another BMP.

2. Evaluate the hydrology of the site to prevent flooding and erosion problems.

Design Considerations:

The design of a catch basin should be done by a registered professional engineer.

Storage basin **depth** is the primary control for performance. Deeper basins that have longer water retention times and less hydraulic turbulence are more efficient. Solids removal becomes impaired when 40-50% of the storage depth is filled. Once this level is reached, solids begin to be washed out of the basin.

See Exhibits 1 and 2 for catch basin designs. Also included are designs for catch basin covers (Exhibits 4, 5, and 6). Exhibit 3 is an optional sewer trap design used to prevent large solids from entering the outlet pipe. It may also function as an odor control device and serve as an oil and water separator.

Exhibit 1 also includes designs for a leaching basin. The leaching basin has a porous sump bottom as opposed to the concrete sump of the catch basin. The leaching basin should only be used where soils will allow infiltration, and where potential groundwater contaminants will not be introduced through stormwater.

Construction Considerations:

Install Construction Barriers around the area to prevent access by pedestrians.

Consider using Diversions and other soil erosion practices up-slope of the catch basin to prevent runoff from entering the site before catch basins are complete.

Filter cloth may be placed over catch basins in construction areas until soil is stabilized. See the Filters BMP.

After Construction:

Stabilize the surrounding area and any established outlet following specifications in the Seeding and Mulching or Sodding BMPs.

Remove temporary structures after vegetation is established.

Maintenance

Proper maintenance of catch basins includes vacuum or adductor cleaning to remove accumulated solid material. Frequent vacuum or adductor cleaning of catch basins removes the accumulated pollutant material and maintains the removal efficiency of catch basins. **Cleaning should be done**

before basins are half full.

Additional Considerations

Solids removed from catch basins may be high in pollutants such as oil and grease, metals, organic and inorganic chemicals, and nutrients. Proper handling of this material includes disposal so as to not contaminate surface water and groundwater. This material may need to be landfilled.

Exhibits

All six attached exhibits are from the Michigan Department of Transportation, Bureau of Highway Planning.

Exhibit 1

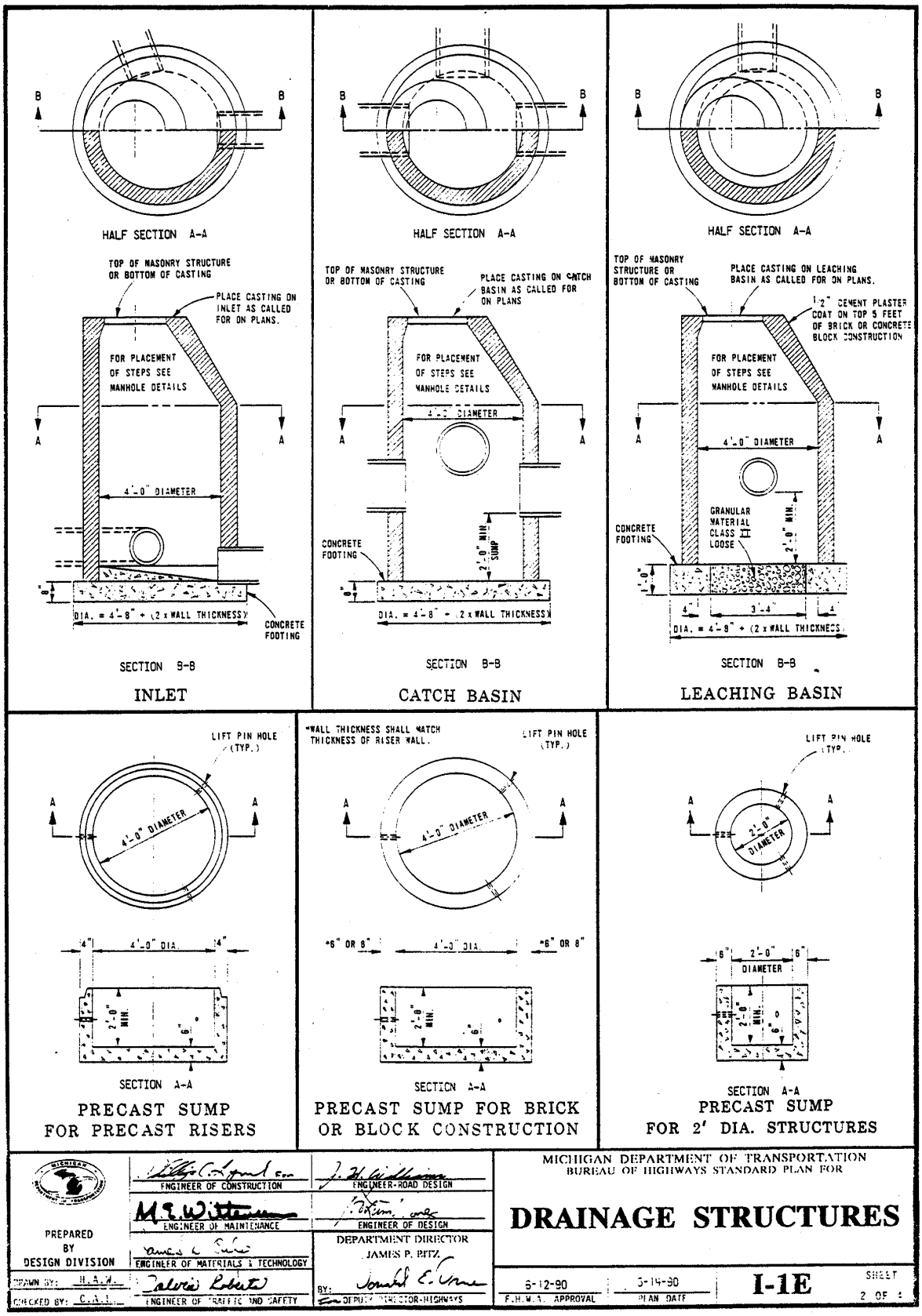
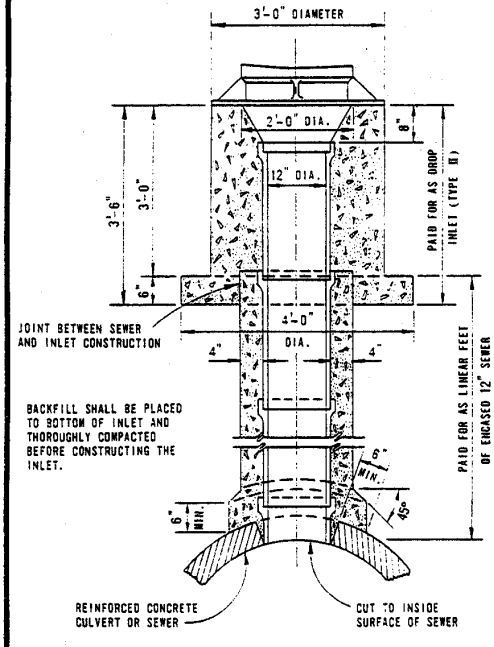
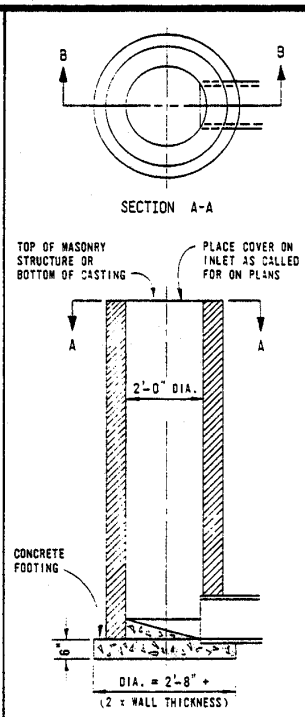

HALF SECTION A-A
TOP OF MASONRY STRUCTURE OR BOTTOM OF CASTING
PLACE CASTING ON INLET AS CALLED FOR ON PLANS.
FOR PLACEMENT OF STEPS SEE MANHOLE DETAILS
4'-0" DIAMETER
DIA. = 4'-8" + (2 x WALL THICKNESS)
CONCRETE FOOTING
SECTION B-B
INLET
HALF SECTION A-A
TOP OF MASONRY STRUCTURE OR BOTTOM OF CASTING
PLACE CASTING ON CATCH BASIN AS CALLED FOR ON PLANS
FOR PLACEMENT OF STEPS SEE MANHOLE DETAILS
4'-0" DIAMETER
CONCRETE FOOTING
2'-0" MIN. SUMP
DIA. = 4'-8" + (2 x WALL THICKNESS)
SECTION B-B
CATCH BASIN
HALF SECTION A-A
TOP OF MASONRY STRUCTURE OR BOTTOM OF CASTING
PLACE CASTING ON LEACHING BASIN AS CALLED FOR ON PLANS.
1/2" CEMENT PLASTER COAT ON TOP 5 FEET OF BRICK OR CONCRETE BLOCK CONSTRUCTION
FOR PLACEMENT OF STEPS SEE MANHOLE DETAILS
4'-0" DIAMETER
GRANULAR MATERIAL CLASS II LOOSE
CONCRETE FOOTING
2'-0" MIN.
3'-4"
DIA. = 4'-8" + (2 x WALL THICKNESS)
SECTION B-B
LEACHING BASIN
LIFT PIN HOLE (TYP.)
4'-0" DIAMETER
4" 4'-0" DIA. 4"
2'-0" MIN.
SECTION A-A
PRECAST SUMP FOR PRECAST RISERS
*WALL THICKNESS SHALL MATCH THICKNESS OF RISER WALL.
LIFT PIN HOLE (TYP.)
4'-0" DIAMETER
*6" OR 8" 4'-0" DIA. *6" OR 8"
2'-0" MIN.
SECTION A-A
PRECAST SUMP FOR BRICK OR BLOCK CONSTRUCTION
LIFT PIN HOLE (TYP.)
2'-0" DIAMETER
6" 2'-0" DIAMETER 6"
2'-0" MIN.
SECTION A-A
PRECAST SUMP FOR 2' DIA. STRUCTURES
PREPARED BY DESIGN DIVISION
DRAWN BY: H.A.W.
CHECKED BY: C.A.L.
ENGINEER OF CONSTRUCTION
ENGINEER-ROAD DESIGN
ENGINEER OF MAINTENANCE
ENGINEER OF DESIGN
DEPARTMENT DIRECTOR JAMES P. PITZ
ENGINEER OF MATERIALS & TECHNOLOGY
ENGINEER OF TRAFFIC AND SAFETY
BY: DEPUTY DIRECTOR-HIGHWAYS
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS STANDARD PLAN FOR
DRAINAGE STRUCTURES
6-12-90 F.H.W.A. APPROVAL
5-14-90 PLAN DATE
I-1E
SHEET 2 OF 2

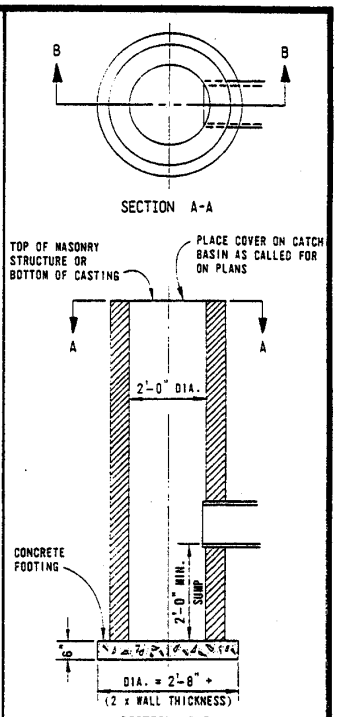
Exhibit 2



DROP INLET (TYPE II)



INLET



CATCH BASIN

NOTES:

ALL COVERS ARE INTERCHANGEABLE ON ANY STRUCTURE BY MODIFYING THE STRUCTURE TOP. COVERS FOR STRUCTURES ON THIS STANDARD ARE SHOWN ON STANDARD PLANS IN DIVISION I.

TOP OF MASONRY STRUCTURES SHALL BE SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE WITH MORTAR OR BRICK AS DIRECTED BY THE ENGINEER.

THE TOP PORTION OF 4' DIAMETER AND LARGER PRECAST REINFORCED UNITS SHALL BE ECCENTRIC IN DESIGN.

PREMIUM JOINTS ARE REQUIRED ON ALL SANITARY MANHOLES. SEE A.S.T.M. DESIGNATION C-923.

GRANULAR MATERIAL CLASS III SHALL BE USED IN BACKFILLING AROUND ALL STRUCTURES THAT FALL WITHIN THE 1 ON 1 INFLUENCE LINES FROM THE EDGE OF PAVEMENT OR BACK OF CURB.

A STRIP OF SOD THREE FEET WIDE SHALL BE PLACED AROUND THE TOP OF EACH STRUCTURE LYING OUTSIDE OF SURFACED PORTIONS OF THE HIGHWAY.

STEPS SHALL BE OF AN APPROVED DESIGN, MADE OF CAST IRON, ALUMINUM OR PLASTIC COATED STEEL. RUNGS SHALL BE A MINIMUM OF 10" CLEAR LENGTH, DESIGNED TO PREVENT THE FOOT FROM SLIPPING OFF THE END AND CAPABLE OF SUPPORTING 300 POUNDS.

THE BELL SHALL BE REMOVED FOR THE FIRST LENGTH OF OUTLET PIPE PROJECTING THROUGH THE WALL OF THE MANHOLE.

PRECAST CONCRETE SECTIONS, SUMPS, AND FLAT TOP SHALL BE BUILT IN ACCORDANCE WITH A.S.T.M. C-478. THE WALLS OF THE PRECAST UNITS MAY HAVE A SLIGHT TAPER TO ALLOW FOR FORM REMOVAL. PRECAST CONCRETE 2' DIAMETER DRAINAGE STRUCTURES SHALL HAVE A MINIMUM 3" WALL THICKNESS WITH A 6" MINIMUM BEARING SURFACE ON TOP. SEE PRECAST RISER RING FOR 2' DIAMETER STRUCTURE.

PIPES ENTERING OR LEAVING PRECAST STRUCTURES SHALL NOT HAVE AN INSIDE DIAMETER GREATER THAN 2' LESS THAN THE INSIDE DIAMETER OF THE STRUCTURE, EXCEPT PIPES ENTERING OR LEAVING 2' INSIDE DIAMETER STRUCTURES MAY HAVE PIPES 1' INSIDE DIAMETER OR LESS.

THE NUMBER OF PIPE OPENINGS IN A RISER SHALL BE DETERMINED BY THE DESIGNER. SPACING BETWEEN OPENINGS SHALL BE 6" MINIMUM. OPENINGS MAY BE CONSTRUCTED BY CASTING, REMOVING THE GREEN CONCRETE, OR BY DRILLING THE OPENINGS IN CURED CONCRETE.

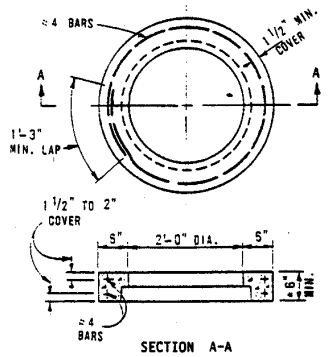
A SEWER TRAP AS SHOWN ON STANDARD PLAN C-19 SERIES SHALL BE PLACED WHERE CALLED FOR IN THE OUTLET SEWER LINE OF CATCH BASINS. SEWER TRAPS WILL BE PAID FOR SEPARATELY AT THE CONTRACT UNIT PRICE EACH.

PRECAST CONCRETE FOOTINGS OR BASES SHALL BE REINFORCED WITH #4 STEEL BARS SPACED AT 1' BOTH WAYS OR WITH TWO LAYERS OF WELDED WIRE FABRIC OF EQUIVALENT CROSS SECTIONAL AREA LAID AT RIGHT ANGLES AND WIRED TOGETHER. REINFORCEMENT SHALL BE PLACED IN TOP OF FOOTING AND SHALL BE MARKED. STEEL REINFORCEMENT MAY BE OMITTED IN CAST-IN-PLACE CONCRETE FOOTINGS.

PRECAST CONCRETE FOOTINGS SHALL BE SUPPORTED BY A COMPACTED 6" GRANULAR SUBBASE.

THE MINIMUM WALL THICKNESS FOR ALL 2', 4', AND 5' DRAINAGE STRUCTURES USING CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE CONCRETE SHALL BE AS SHOWN IN TYPICAL WALL SECTIONS.

THE CONICAL SECTION OF MANHOLES OR CATCH BASINS CONSTRUCTED OF BLOCK OR BRICK WILL BE SHROUDED WITH GEOTEXTILE FABRIC FROM THE TOP DOWN 5' MINIMUM OR THROUGH THE FROST ZONE. ENOUGH GEOTEXTILE MATERIAL WILL BE LEFT ON THE TOP (8" OR MORE) TO ROLL OVER THE TOP OF THE CONE.



* WHEN RISER TONGUE LENGTH GREATER THAN 3", USE 2 TIMES TONGUE LENGTH.

NOTE: PRECAST RISER RING SHALL FULLY ENGAGE THE TONGUE OF THE RISER PIPE.

PRECAST RISER RING
FOR 2' DIAMETER STRUCTURE

PREFORMED HIGH DENSITY POLYSTYRENE FILLER PIECES MAY BE USED TO CHANNEL FLOW IN THE BOTTOM OF MANHOLES PROVIDED THEY HAVE AT LEAST 2" OF CONCRETE COVER. THE USE OF THIS MATERIAL FOR CHANNEL FLOW IS RESTRICTED TO MANHOLES WHERE THE BOTTOM SECTION IS NOT SUBJECT TO FREEZING. THE USE OF THIS MATERIAL MUST BE APPROVED BY THE ENGINEER.

PREPARED BY DESIGN DIVISION

DRAWN BY: H.A.W.
CHECKED BY: C.A.L.

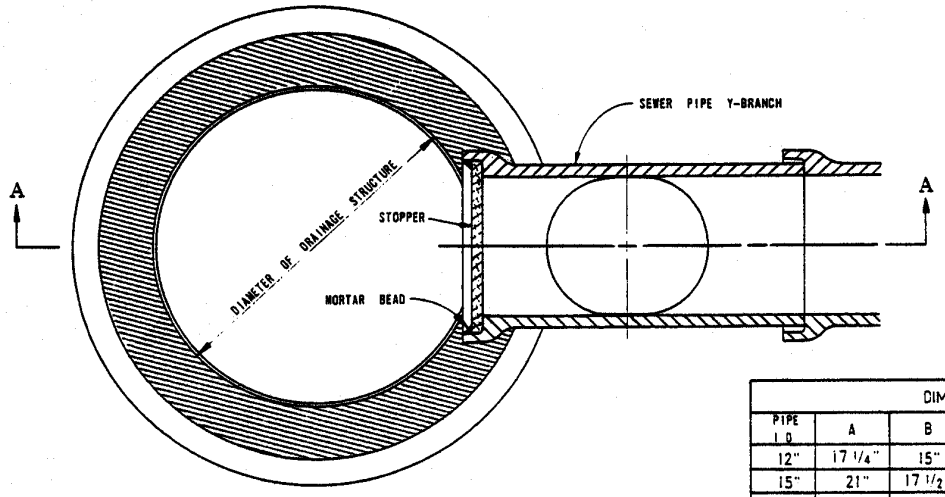
ENGINEER OF CONSTRUCTION
ENGINEER OF MAINTENANCE
ENGINEER OF MATERIALS & TECHNOLOGY
ENGINEER OF TRAFFIC AND SAFETY
ENGINEER-ROAD DESIGN
ENGINEER OF DESIGN
DEPARTMENT DIRECTOR
JAMES P. PITZ
BY: DEPUTY DIRECTOR-HIGHWAYS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS STANDARD PLAN FOR

DRAINAGE STRUCTURES

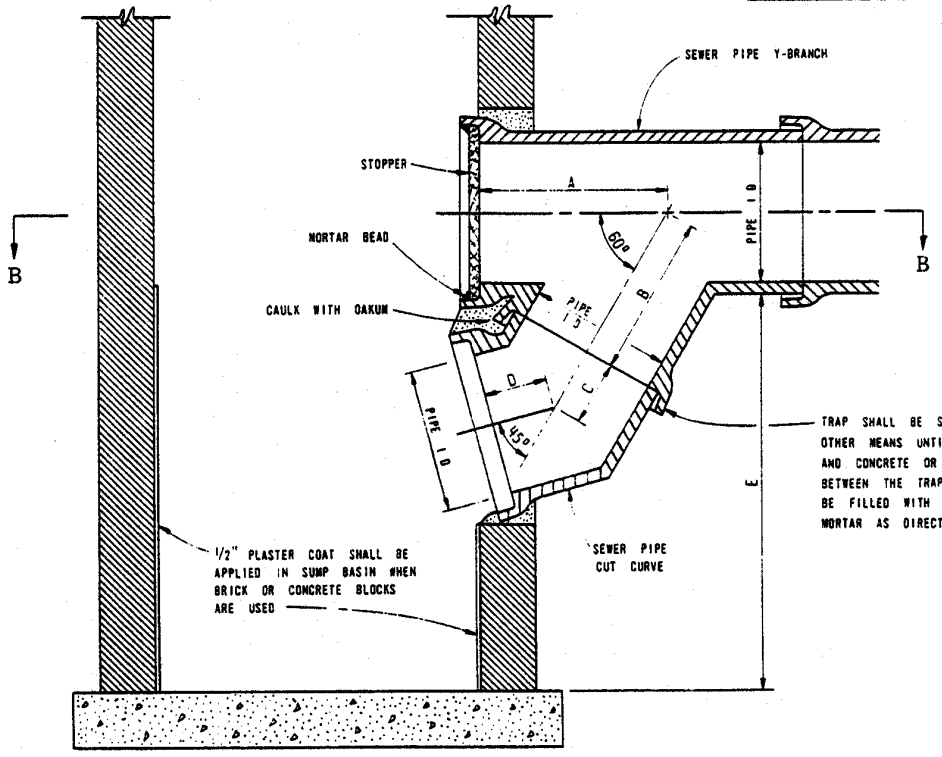
6-12-90 F.H.W.A. APPROVAL
5-14-90 PLAN DATE
I-1E
SHEET 4 OF 4

Exhibit 3



SECTION B-B

DIMENSIONS					
PIPE I.D.	A	B	C	D	E
12"	17 1/4"	15"	5 7/8"	5 7/8"	3'-0"
15"	21"	17 1/2"	7 1/8"	7"	3'-0"
18"	25 1/2"	21 1/2"	8 3/8"	8 3/8"	4'-0"
21"	28"	24"	9 1/2"	9 1/2"	5'-0"
24"	30 1/2"	28"	9 7/8"	10 1/2"	5'-0"



SECTION A-A

NOTES:

A CATCH BASIN, WHERE A SEWER TRAP IS TO BE PLACED, SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD PLAN I-5 SERIES EXCEPT AS SHOWN ON THIS PLAN.

SEWER TRAP SHALL BE MADE OF THE SAME MATERIAL AND HAVE THE SAME STRENGTH AS INLET SEWER PIPE.

PREPARED BY DESIGN DIVISION

DRAWN BY M.A.W.

CHECKED BY V.H.

ENGINEER OF ROAD DESIGN

ENGINEER OF TESTING AND RESEARCH

ENGINEER OF CONSTRUCTION

for ENGINEER OF DESIGN

DEPARTMENT DIRECTOR
JOHN P. WOODFORD

BY DEPUTY DIRECTOR - HIGHWAYS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS STANDARD PLAN FOR

SEWER TRAP

F.H.W.A. APPROVAL 3-4-80 DATE

12-20-79 PLAN DATE

I-19B

SHEET 1 OF 1

Exhibit 4

NOTES APPLYING TO STANDARD PLAN I-10B:

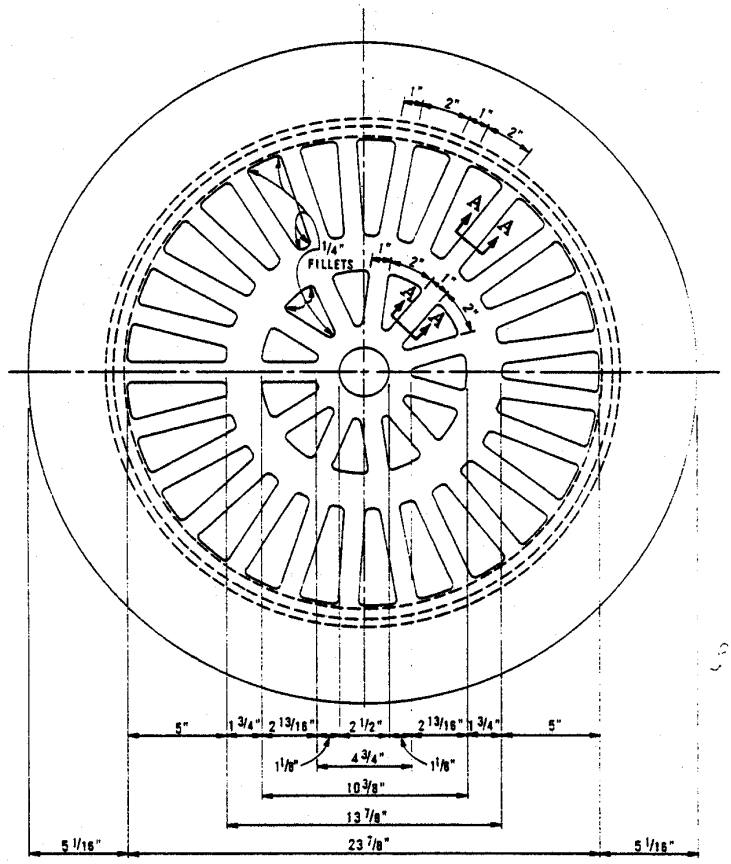
THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATIONS FOR GRAY-IRON CASTINGS AASHTO M 105, AND SHALL HAVE A MINIMUM STRENGTH AS PROVIDED FOR CLASS NO. 30 GRAY-IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

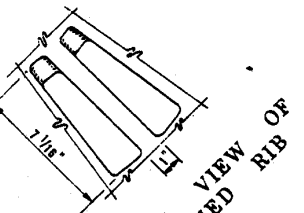
THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED AND SHALL BE COATED WITH COAL-TAR PITCH VARNISH.

THE CASTING SHALL BE SET IN SOFT MORTAR BED TO ELEVATION SHOWN ON PLANS AND IN SUCH A MANNER AS TO PROVIDE A FIRM AND UNIFORM BEARING ON THE MASONRY WALL.

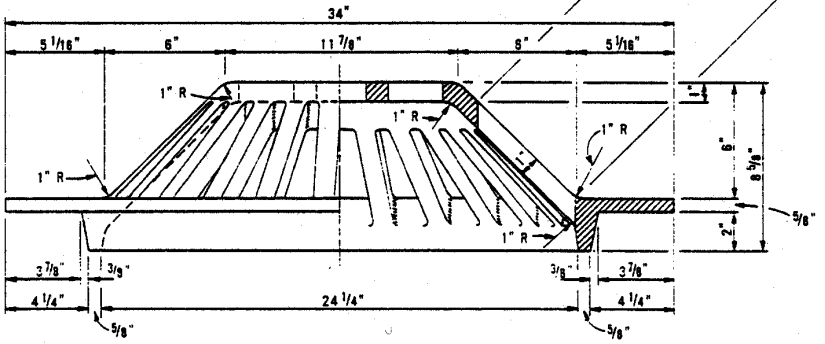
THIS COVER IS DESIGNED TO FIT ON ANY INLET OR CATCH BASIN SHOWN ON STANDARD PLAN I-5 SERIES OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON PLANS.



PLAN VIEW



NORMAL VIEW OF INCLINED RIB



HALF ELEVATION HALF SECTION

SECTION A-A

PREPARED BY DESIGN DIVISION

DRAWN BY:

CHECKED BY:

ENGINEER OF CONSTRUCTION

ENGINEER OF MAINTENANCE

ENGINEER OF TESTING AND RESEARCH

ENGINEER OF TRAFFIC AND SAFETY

ENGINEER - ROAD DESIGN

ENGINEER OF DESIGN

DEPARTMENT DIRECTOR JOHN P. WOODFORD

BY: DEPUTY DIRECTOR - HIGHWAYS

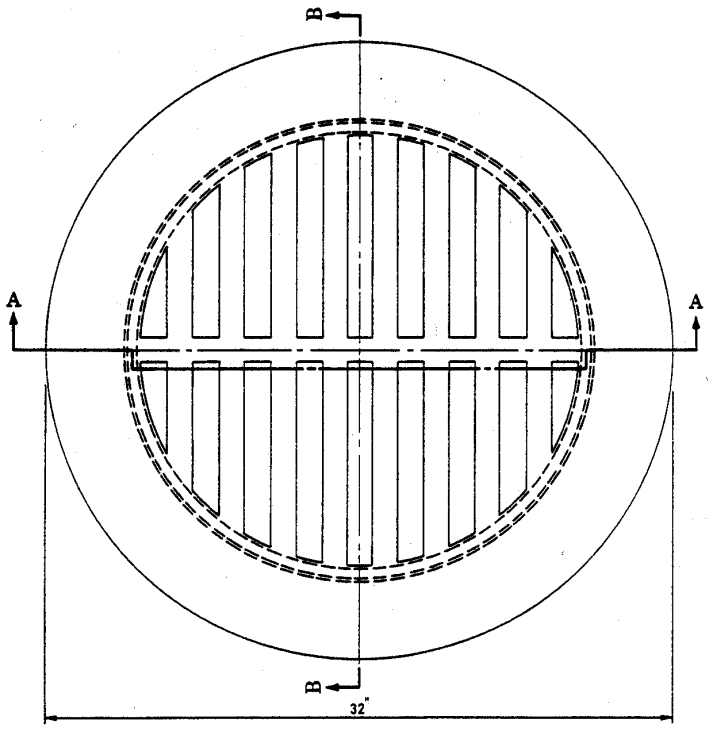
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS STANDARD PLAN FOR

COVER E

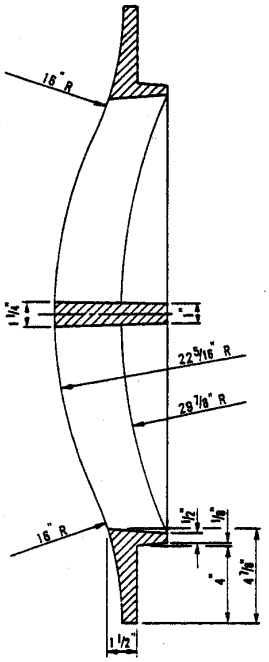
FOR USE ON STRUCTURES IN DITCHES WHERE NOT SUBJECT TO TRAFFIC

9-25-81	7-21-81	I-10B	SHEET 1 OF 1
F.H.W.A. APPROVAL	PLAN DATE		

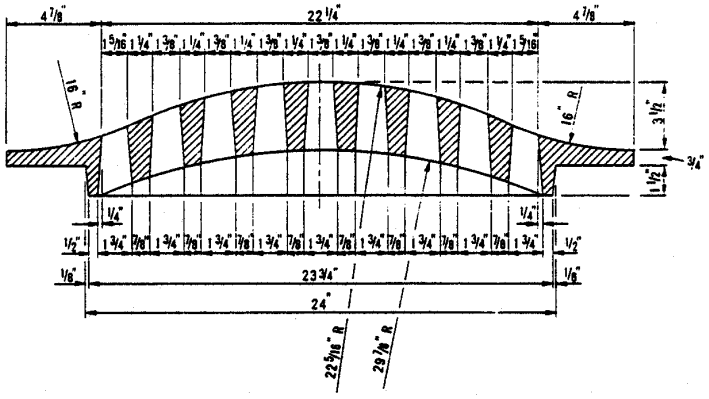
Exhibit 5



PLAN VIEW



SECTION B-B



SECTION A-A

NOTES APPLYING TO STANDARD PLAN I-12B:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATIONS FOR GRAY-IRON CASTINGS AASHTO M 105, AND SHALL HAVE A MINIMUM STRENGTH AS PROVIDED FOR CLASS NO. 30 GRAY-IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL-TAR PITCH VARNISH.

THE CASTING SHALL BE SET IN SOFT MORTAR BED TO ELEVATION SHOWN ON PLANS AND IN SUCH A MANNER AS TO PROVIDE A FIRM AND UNIFORM BEARING ON THE MASONRY WALL.

THIS COVER IS DESIGNED TO FIT ON ANY INLET OR CATCH BASIN AS INDICATED ON STANDARD PLAN I-5 SERIES OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON PLANS.

PREPARED BY DESIGN DIVISION

DRAWN BY: H.A.H.
CHECKED BY: J.M.

ENGINEER OF CONSTRUCTION
ENGINEER OF MAINTENANCE
ENGINEER OF TESTING AND RESEARCH
ENGINEER OF TRAFFIC AND SAFETY

ENGINEER - ROAD DESIGN
ENGINEER OF DESIGN
DEPARTMENT DIRECTOR
JOHN P. WOODFORD
BY:
DEPUTY DIRECTOR - HIGHWAYS

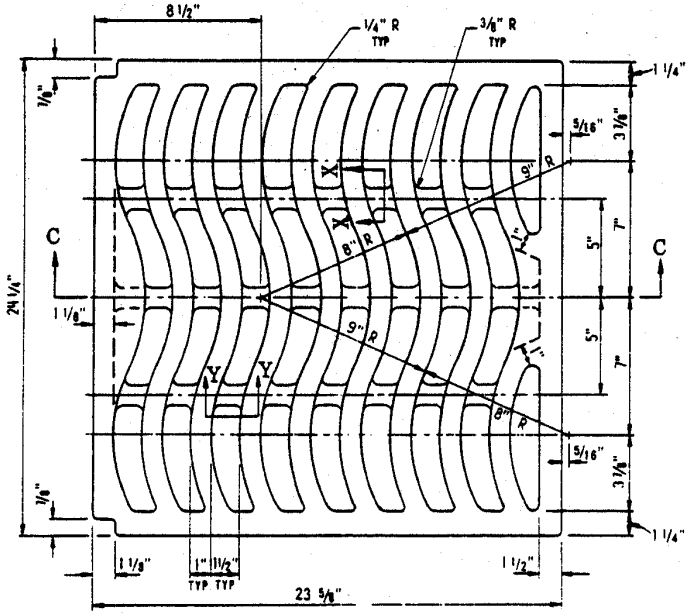
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS STANDARD PLAN FOR

COVER G

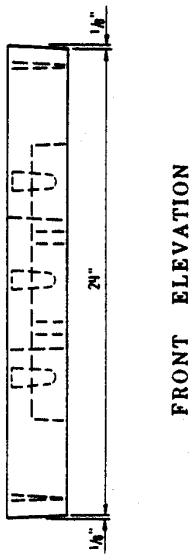
FOR USE IN DITCHES AND AREAS SUBJECT TO MINOR TRAFFIC

9-25-81	7-21-81	I-12B	SHEET 1 OF 1
F.H.W.A. APPROVAL	PLAN DATE		

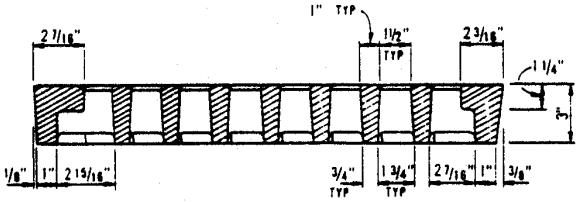
Exhibit 6



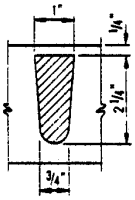
PLAN VIEW OF GRATE



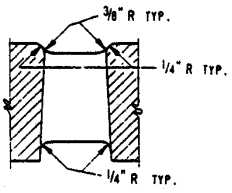
FRONT ELEVATION



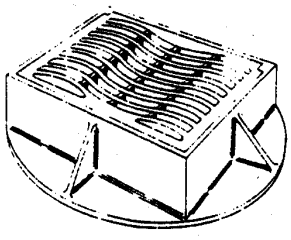
SECTION C-C



SECTION X-X



SECTION Y-Y



NOTES APPLYING TO STANDARD PLAN I-20C:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF CURRENT STANDARD SPECIFICATIONS FOR GRAY-IRON CASTINGS AASHTO M 105, AND SHALL HAVE A MINIMUM STRENGTH AS PROVIDED FOR CLASS NO. 30 GRAY-IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL-TAR PITCH VARNISH.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THIS COVER IS DESIGNED TO FIT ON ANY INLET OR CATCH BASIN SHOWN ON STANDARD PLAN I-5 SERIES OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON PLANS.

PREPARED BY DESIGN DIVISION

DRAWN BY: M.A.W.

CHECKED BY: V.R.

ENGINEER OF CONSTRUCTION

ENGINEER OF MAINTENANCE

ENGINEER OF TESTING AND RESEARCH

ENGINEER OF TRAFFIC AND SAFETY

ENGINEER OF DESIGN

DEPARTMENT DIRECTOR

DEPUTY DIRECTOR

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS STANDARD PLAN FOR

COVER R

9-25-81	7-21-81	I-20C	SHEET 2 OF 2
F.H.W.A. APPROVAL	PLAN DATE		